ENVIRONMENTAL Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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1,2-Dichloroethane (1,2-DCA): Health Information Summary

1,2-DCA is a colorless liquid with a sweet odor and taste that has no naturally occurring sources. The vast majority of 1,2-DCA produced is used in the manufacture of other chemicals. Small amounts are used in leaded gasoline. 1,2-DCA was used in the past in degreasing products, pesticides, adhesives, and paint and varnish removers. It is rarely used in consumer products today.

1,2-DCA will evaporate into the air at room temperature; therefore, breathing in the vapors can be an important route of exposure. 1,2-DCA does not bind strongly to soil unless it has a high level of organic matter. Consequently, in many soils this chemical will readily migrate to groundwater. 1,2-DCA can remain in groundwater for several years because chemical and biological breakdown in groundwater is slow. 1,2-DCA does not bioaccumulate (build up) in plants or animals.

Health Effects

Absorption/Metabolism

1,2-DCA is readily absorbed when inhaled or ingested. It is absorbed to a lesser degree through the skin. 1,2-DCA is metabolized rapidly by the body so that it is entirely excreted within 48 hours after exposure.

Short-Term (Acute) Effects

Because of its anesthetic properties, inhalation exposure to high concentrations of 1,2-DCA will first affect the central nervous system in humans. Early symptoms can include headache, dizziness, weakness, nausea, vomiting and stomach pain. 1,2-DCA can also damage the liver and kidneys. Effects observed in animal studies were similar to humans. Acute inhalation exposure to 1,2-DCA in mice decreased their ability to fight infections.

Mid-Term (Sub-chronic) and Long-Term (Chronic) Effects

Reports of inhalation exposure to 1,2-DCA in the workplace document nausea, vomiting, weakness, fatigue, nervousness, stomach pains, diarrhea, and changes in heart rate. Exposure for 13 weeks to 1,2-DCA in drinking water caused kidney damage in rodents. Kidney lesions were reported in dogs exposed by inhalation for eight months.

Carcinogenic (Cancer-Causing) Effects

The results of studies investigating human exposure to 1,2-DCA and increased cancer incidence are inconclusive because the populations were also exposed to several other chemicals. Carcinogenicity studies on animals exposed orally have noted increased incidences of tumors at several sites, including the spleen, lungs, liver, mammary gland, pancreas and adrenal gland in rodents. Inhalation exposures to animals have resulted in cancer of the liver, lung, brain, mammary glands, and lymphoid system.

Under the old cancer guidelines, the US Environmental Protection Agency classified 1,2-DCA in Group B2 (probable human carcinogen) due to positive evidence in animal studies and insufficient data for humans. It has not yet been reviewed for re-classification under the current guidelines.

Developmental Effects
An increase in embryo death in rats exposed to 1,2-DCA by inhalation suggests it can effect reproduction. No birth defects were observed in animals exposed orally.

Health Standards and Criteria

The EPA has established a maximum contaminant level (MCL) for 1,2-DCA in public drinking water systems. MCLs are enforceable drinking water standards determined by balancing the adverse health effects of a particular chemical against the feasibility and costs of treating contaminated water, and a consideration of the lowest level at which a chemical can be detected in water. The MCL for 1,2-DCA is 5 ppb.

Using a sub-chronic drinking water study in rodents, the U.S. Health and Human Services derived a safe exposure level in drinking water (minimal risk level) for up to a one year time period. Based on that minimal risk level, the EHP has calculated that a concentration of up to 140 ppb of 1,2-DCA in drinking water is not likely to cause non-cancer adverse health effects in adults for a chronic exposure duration. This value is a guideline, not a regulatory standard.

Because 1,2-DCA is considered a probable human carcinogen, there may be some degree of carcinogenic risk even below the MCL. Based upon EPA calculations, the Environmental Health Program estimates that drinking water containing 5 ppb of 1,2-DCA would be associated with an increased lifetime risk of cancer of about one in 100,000, i.e., one excess cancer case in 100,000 people exposed. This estimate is based on an average intake of two liters (0.53 gallon) of water per day by a 70 kg (154 lb.) adult for 70 years.

The Occupational Safety and Health Administration enforceable standard (permissible exposure limit) for 1,2-DCA in workplace air is 50 parts per million (ppm) averaged over an eight hour exposure period.

Suggested Reading and References

Casarett and Doull's Toxicology: The Basic Science of Poisons, Sixth Edition. Klaassen, C.D., ed. McGraw-Hill Publishing Co., Inc., New York, 2001.

Toxicological Profile for 1,2-Dichloroethane (Update). Agency for Toxic Substances and Disease Registry (ATSDR). Atlanta, GA. September, 2001.

Toxicological information on 1,2-Dichloroethane. Compiled on the Hazardous Substance Data Bank (HSDB). National Library of Medicine. Bethesda, MD. Address: http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB

Toxicological information on 1,2-Dichloroethane. Integrated Risk Information System (IRIS). U.S. EPA, Office of Health and Environmental Assessment. Last significant revision 1991.

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